

On-Scene EM/EO Assessment

John Cook

Naval Research Laboratory
Monterey, CA 93943-5502

phone (831) 656-4785 fax (831) 656-4769 email cook@nrlmry.navy.mil

Award Number: N0001499WX30120

<http://stratus.nrlmry.navy.mil>

LONG-TERM GOAL

Develop the capability for the Tactical Atmospheric Modeling System-Real Time (TAMS-RT), an end-to-end on-scene analysis/forecast system for real-time organic data assimilation, to produce atmospheric and tactical impact variables to forward-deployed forces.

OBJECTIVES

Monitor and support TAMS-RT use at deployed locations world-wide and implement analysis/model improvements and bug fixes as identified by operators and R&D testing.

APPROACH

Monitor and support TAMS-RT in Bahrain and software provided for use by the NRL Data Fusion for Weather Assessment (DaFWA) project.

Implement algorithms for tactically important physical parameters (ceiling, visibility, and heat index) in TAMS-RT and improve the vertical resolution of pressure-level output capability. Incorporate an automatic scaling factor for graphics and implement meteogram graphics for tactical weather parameters.

Develop the capability to locally retrieve and analyze satellite-devised wind observations in TAMS-RT. Enhance TAMS-RT to use a new multi-level nesting scheme to increase computational efficiency.

WORK COMPLETED

TAMS-RT is end-to-end on-scene analysis/forecast system for real-time organic data assimilation which runs on a suite of dedicated computer hardware. TAMS-RT consists of software hosted on one HP TAC-4 and two SGI computer systems. The core of TAMS-RT is the atmospheric component of the NRL Coupled Ocean/Atmosphere Mesoscale Prediction System (COAMPS), which includes the Multi-Variate Optimum Interpolation (MVOI) and COAMPS Ocean Data Assimilation (CODA) system. The Tactical Environmental Database System (TEDS), Complex Quality Control (QC) software, Integrated Portable Visualization System software (IPVS), and web-based Remote Monitor software (RMON) are also integral components of TAMS-RT and provides data ingest, storage, management, visualization, and dissemination capabilities.

Report Documentation Page			Form Approved OMB No. 0704-0188	
<p>Public reporting burden for the collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington VA 22202-4302. Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to a penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number.</p>				
1. REPORT DATE 30 SEP 1999	2. REPORT TYPE	3. DATES COVERED 00-00-1999 to 00-00-1999		
4. TITLE AND SUBTITLE On-Scene EM/EO Assessment		5a. CONTRACT NUMBER		
		5b. GRANT NUMBER		
		5c. PROGRAM ELEMENT NUMBER		
6. AUTHOR(S)		5d. PROJECT NUMBER		
		5e. TASK NUMBER		
		5f. WORK UNIT NUMBER		
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) Naval Research Laboratory, Monterey, CA, 93943-5502		8. PERFORMING ORGANIZATION REPORT NUMBER		
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)		10. SPONSOR/MONITOR'S ACRONYM(S)		
		11. SPONSOR/MONITOR'S REPORT NUMBER(S)		
12. DISTRIBUTION/AVAILABILITY STATEMENT Approved for public release; distribution unlimited				
13. SUPPLEMENTARY NOTES				
14. ABSTRACT				
15. SUBJECT TERMS				
16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT Same as Report (SAR)	18. NUMBER OF PAGES 4
a. REPORT unclassified	b. ABSTRACT unclassified	c. THIS PAGE unclassified		
19a. NAME OF RESPONSIBLE PERSON				

TAMS-RT has been running on a routine basis daily at NRL Monterey and operationally at the Naval Central Meteorology and Oceanography Center (NCMOC) Bahrain for the past year. In addition, TAMS-RT has been installed operationally at the Naval Pacific Meteorology and Oceanography Center (NPMOC) San Diego and several other locations. TAMS-RT was supported by scientific site/training visits by a number of NRL personnel. Additional technical personnel are scheduled to visit NCMOC for training and to participate in Fleet Battle Experiment – Foxtrot in December 1999. These visits serve to train operators and gather operational feedback on TAMS-RT, to brief operators on a deeper understanding of the complexities of the software, to sensitize researchers to operational issues, and to discuss follow-on projects. Use of the TAMS-RT at Bahrain was observed by OPTEVFOR, and the Commander, Naval Meteorology and Oceanography Command (CNMOC) named Fleet Numerical Meteorology and Oceanography Center (FNMOC) as the lead transition activity to install TAMS-RT at the remaining six CNMOC sites during FY 00 and FY 01.

Algorithms developed by the National Center for Atmospheric Research (NCAR) for estimating ceiling and visibility based on mesoscale model forecast fields were adapted to COAMPS and implemented in TAMS-RT. Similarly, an algorithm for surface heat index, an important parameter in Bahrain, was also added to COAMPS. A meteogram graphic providing a time series of parameters at a location was developed and implemented in TAMS-RT. An enhanced version of the meteogram supporting parameters identified by strike warfare operators was also developed and is in the process of being modified into a stand-alone web-based server for easy application from any web browser. The improved vertical resolution of pressure-level output capability was requested by users to support the meteograms.

A means of providing a local capability to ingest, retrieve, and quality control cloud-tracked and water vapor-tracked winds were put in place. COAMPS was enhanced to use a new multi-level nesting scheme. The new scheme provides more than one nest of a particular resolution to reside within a larger-scale parent grid at the same time. This capability allows better utilization of computational assets to meet the growing needs of customers to run more high-resolution inner nests.

The RMON software has also been upgraded to allow password-only access to sensitive COAMPS forecast areas.

RESULTS

TAMS-RT provides an unprecedented capability to run and maintain a sophisticated atmospheric data analysis, forecast, and data assimilation system on-scene. The experience running a prolonged real-time demonstration at NCMOC Bahrain has led to several enhancements by adding parameters of tactical value and modifying COAMPS to be more tactically relevant. The ability to utilize local satellite-derived wind data in the analysis provides a true organic rapid environmental assessment capability important for automatically maintaining a database of frequently updated current environmental conditions.

During the demonstration in Bahrain, numerous technical impediments were overcome, the most serious related to network interruptions, particularly the local SIPRNET performance. Solutions were found in coordination with network engineers from the Space and Naval Warfare Systems Command (SPAWAR), the Defense Information Systems Agency (DISA), and CNMOC. Also, local sensitivity

to the position of high-resolution forecast areas was alleviated by automating the password protection of web pages for sensitive sites.

IMPACT/APPLICATIONS

TAMS-RT represents a tremendous increase in the sophistication of the tools available to the forward deployed meteorology and oceanography operator and, more importantly, it represents a step-function shift in the concept of operations. The ability of COAMPS to resolve mesoscale features influenced by complex terrain, and the interface of the model data to decision aids, will be of great value to the Navy by improving the safety of operations and enhancing the ability of forward-deployed forces to exploit the environment for tactical advantage. TAMS-RT was accomplished with strong management and sponsor support and represents the coordinated effort of a dedicated group of scientists, programmers, and system administrators whose expertise spans the technical capability from model development to software engineering to applications programming. This effort was recognized by NRL with the Technology Achievement Award for six members of the TAMS-RT development team and support awards for four other contributors.

TAMS-RT received high level visibility in the statement of the Honorable H. Lee Buchanan, Assistant Secretary of the Navy (Research, Development and Acquisition), before the Subcommittee on Emerging Threats and Capabilities of the Senate Armed Services Committee on FY2000 Science and Technology Programs in the Department of the Navy (April 20, 1999). TAMS-RT was also briefed to the Honorable Jerry MacArthur Hultin, Under Secretary of the Navy, by Dr. R. Gibbs of the Naval Surface Warfare Center, Dahlgren Division, as a component of the Weapons of Mass Destruction technology area (June 21, 1999).

TRANSITIONS

CNMOC named FNMOC as the lead transition activity to install TAMS-RT at the remaining six CNMOC sites during FY 00 and FY 01. An additional award from ONR was received to facilitate the transition (N0001499WX30427).

TAMS-RT also transitions to an existing 6.4 program at the Space and Naval Warfare Systems Command PMW 185 (SPAWAR PE 0603207N X2343): the On-Scene Tactical Atmospheric Forecast Capability (STAFC), a component of the Navy Integrated Tactical Environmental Subsystem (NITES I) Phase II.

RELATED PROJECTS

Related 6.2 projects within PE 0602435N are award numbers N0001499WX30121 (Shipboard model development), N0001499WX30271 (NOWCAST), N0001499WX40070 (TAMS-RT), N0001499WX30427 (TAMS-RT transition), and N0001499WX40033 which encompasses the following NRL base projects: BE-35-2-32 (DaFWA), and BE-35-2-44 (moisture parameterization). The related 6.4 project under PE 0603207N is X2343 (STAFC).

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